HOMO ECONOMICUS AND CONSTITUTIONAL CHANGE: SOLUTIONS TO FREE RIDER BEHAVIOR IN THE PROVISION OF PUBLIC GOODS (1)

Francisco García Sobrecases (*)

Introduction: *homo economicus* and rational cooperation

When attempting to offer an explanation for the phenomenon of collective action, beliefs and motivating factors must first be considered. One must analyze the participation of the individual in collective action itself. This means examining the individual's choice between cooperative and non-cooperative strategy. It must be stressed that the consolidated collective action should not be justified in terms of benefits brought to the group. Group rationality alone, therefore, is not enough to explain collective action (2).

The approach which is to be developed in this paper is that of individual motivations, more than the beliefs held by individuals, which shall be considered of secondary importance (3). Therefore, keeping in mind that these beliefs are fully enveloped in uncertainty, they are also subject to motivational and cognitive perspectives. Following this line of thought and that which Elster (1990) develops, a typology of individual motivations has been proposed through which the individual will demonstrate his/her cooperation. Through this typology, we shall attempt to justify individual motives influencing an individual's attitude toward cooperation - rational cooperation in agreement with the individual's behavior.

However, we must first distinguish between rationality itself and social norms (4) as primary motives for cooperation. In order to analyze these categories, the diagram designed by Elster (1990:36) will be used as a reference (figure 1). There are motivations which Elster terms «second order motivations» that, from a perspective of rationality, clarify if this motivation in turn is based on selfish or non-selfish behavior. This selfish or non-selfish rationality then opens

---

(*) Universidade de Valencia.

(1) In this article the author, using a more specific methodological framework, shall complete to a fuller extent some of the hypotheses which were partially developed in the paper presented at the 10th ASEPELT Meeting held in Albacete (Spain) in May, 1996.

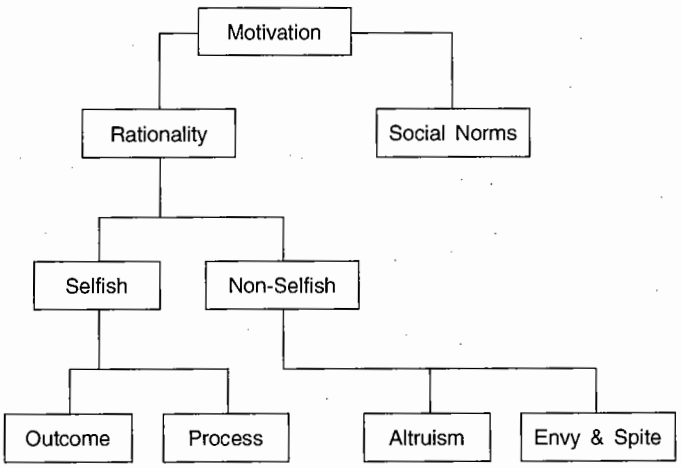
(2) Elster, J., 1990, p. 34. Elster indicates this focus from the standpoint of methodological individualism. He writes, «Even though by assumption it is better for all if all cooperate than if none do, it is also true by assumption that it is even better for the individual [...] to abstain from cooperating.»

(3) There are two reasons for explaining collective action through an analysis of the importance of beliefs. First, each person who potentially cooperates should bear in mind the technology of collective action (the benefits and costs of contributing at different levels of cooperation). Second, he/she should have an idea of what this level might be, i. e. the amount expected from others who cooperate.

(4) Social norms, treated as motivations, are presented in the following section.

the way for a third level of personal motivations that characterize collective action involving the individual: motivations directed towards the outcome or the process (in the event that there are higher rational, selfish motivations) or motivations based on altruism or envy and spite (in the case of non-selfish rational motivation).

FIGURE 1



Through this diagram, we try to gather together all types of motivations leading to cooperation based on rationality. Therefore, we must stress, as Elster does, that «the primacy of selfish and outcome-oriented motivations is a purely methodological one, with no implications for the empirical frequency of the various types of motivation» ([5]). This is the reason why on many occasions we see individual behavior extended to practically the whole of society. The agents achieve a greater level of welfare only because a particular individual (one whose motivations are not related to the selfish consequence of an outcome) attains higher levels of welfare. In other words, levels of welfare reached by an individual are a consequence of the increase of the aggregated welfare of the group. A similar outcome is obtained in situations where the benefits achieved in the process of performance are greater than those revealed through the outcomes sought by the individual. The two situations described clearly show the existence of personal behaviors or motivations, based on rationality, which are observed in society and are part of the collective action carried out by the agents.

Nevertheless, when attempting to explain the participation of the individual at the heart of collective action, the simplest type of motivation or behavior is usually used as a starting point, and this is what has methodologically cha-

([5]) Elster, J., 1990, p. 36. Elster puts forth an extremely important methodological argument: what happens with irrational behaviors? He affirms, quite simply, that in order for these to be logical, the individuals should act rationally most of the time, thus lowering this behavior to a wider base of rationality.

racterized the literary tradition of Public Economy. According to the typology of Elster, this behavior could be defined as rational, selfish behavior, as directed towards the attainment of the outcomes ([6]). Further, from this standpoint, we understand that the strategy adopted by the individual is one of non-cooperation. However, as indicated earlier, there are situations in which individual behavior, if it is indeed directed in this sense, may adopt the cooperative strategy so as to promote the personal interests of the agents involved in the collective action.

Therefore, there are two cases which have traditionally been described as true proof of rational cooperation as seen from the individual behavior described ([7]). First is the situation in which any one of the individuals may express an interest in being the sole provider of the public good, although others may also have access to it. Second is the situation in which a subgroup of the individuals may oblige or induce the others to cooperate, carrying out such action with selective (positive or negative) incentives. These incentives are only used for individual behavior. Thus, the negative incentives (sanctions or punishment) are linked to non-cooperative behaviors while the positive incentives (rewards) are linked to cooperative choices. It is particularly important to highlight the latter case since it describes the basic case of implementing an agent capable of gathering enough strength and power over the other individuals so as to establish a working system of punishment incentives. With this system we can correct the non-cooperative behaviors leading to the free rider phenomenon so widely proclaimed by the conventional theory of public goods. Clearly, we are dealing with a concrete case of the second assumption.

Additionally, the foundation on which the theory of public goods rests is based on this motivation of collective action ([8]), hence an immediate consequence of the classic assumptions of individual economic behavior. Yet it is necessary, in turn, to analyze other behaviors of collective action as seen in the empirical evidence as well as the individual's participation. A motivation of the aforementioned characteristics does not only influence the individual as a member of a community; there are many other motivations apart from individual rationality, such as those seen in the typology developed by Elster. Additionally, following this line of discussion, it is necessary to rely on social norms as a base for diverse behaviors. We should emphasize the variety of existing motivations which facilitates the attainment of an elevated degree of collective action and distances us from the traditional behavioral structures ([9]). It is at this point that we could begin to recreate a theory of public goods from which the consequence of free rider behavior is extracted, compatible with empirical evidence which, to some degree, does not support this individual attitude in all cases and situations.

([6]) Elster, J., 1985a, p. 243. By definition, collective action cannot arise from this motivation.

([7]) Olson, M., 1965, pp. 50-51.

([8]) The motivation makes reference to rational, individual behaviors, selfishly-oriented towards the attainment of an outcome.

([9]) This is still considered today as a «thorny» subject, given that it is a consequence of the interaction of the individuals who, for many different reasons, participate.

Social norms and collective action

As we have suggested, individual motivations are not based solely on rationality. Indeed, social norms also predetermine individual behavior. Although less visible than the former, this form of collective action is not, by any means, of lesser importance. Norms of social behavior can be interpreted as the reactions of the society itself so as to compensate market failures ([10]). No society is viable without the norms and rules of behavior. These become necessary for viability in areas where the strict economic incentives are absent or cannot be created ([11]). Therefore, social norms are to be the other pillar upholding cooperation between individuals so as to solve the problem of collective action in the provision of public goods.

Social norms as norms of cooperation

The introduction of social norms as a foundation for the problem of collective action expands even more so to the point of view of individual behaviors. Not only is the traditional hegemony broken, a hegemony which bases human behavior on the rationality of actions, especially the economic ones, but the social norms also should be considered in order to take collective decisions. Here the hegemony of *homo economicus* ([12]) ends in the theoretical context of the Economy and *homo sociologicus* appears in comparison. The behavior of the former is defined by instrumental rationality, while that of the latter is dictated by social norms. The former is conditioned by future rewards, while the latter is influenced by quasi-inertial forces. The former adapts to the changing circumstances, seeking to improve his/her state, while the latter is unaffected by the circumstances, adhering to the predetermined behavior even when better options for optimizing his/her personal welfare are available ([13]). More specifically, there are two different models of human behavior in opposition here: on the one hand, that of the anti-social atom, on the other, that of the passive executor of inherited principles.

Due to the strength of the empirical evidence itself, there is growing pressure for the theoretical body of rational choice ([14]) to begin to reflect on how to increase cooperation among individuals through non-official, social restrictions (not directed from coercion) such as norms, agreements and shared values to name

---

([10]) Arrow, K. J., 1970, p. 20. «It is useful for individuals to have some trust in each other's word. In the absence of trust, it would be very costly to arrange for alternative sanctions and guarantees, and many opportunities for mutually beneficial cooperation would have to be forgone.»

([11]) Johansen, L., 1977, p. 148.

([12]) Elster, J., 1983, p. 21. It must be stressed that the economic human being «[...] is a much more justified creature [...]» than the rational human being. While the latter does not entail anything more than consistent preferences, and therefore, consistent plans, the former has preferences which are not only consistent, but also complete, continual and selfish.

([13]) Elster, J., 1990, p. 97.

([14]) Traditionally this field has been responsible for analyzing problems which have arisen from the divergence between collective and individual interests, as well as analyzing the necessary incentives for individuals to act according to the general interest.

a few. Thus, the objective of this new focus of rational choice implies that these social norms would consolidate the full compromise between the participants in collective action through the creation of mutually strengthening expectations ([15]).

Following the conceptual framework initiated earlier through the typology of Elster, rational action is related to the future and conditional results which the individual wishes to achieve. The social norms are not normally oriented towards the attainment of a result, and the imperatives contained in the social norm are unconditional. Should the social norms be oriented toward a result, they are not oriented to the future, thus making the action depend on past situations and, occasionally, on hypothetical results.

For the norms to be social, they should be shared by other people, being partially upheld by their approval and disapproval. However, these norms also acquire the category of 'social' in the sense that the other people (or individuals) are sufficiently important enough so as to ensure the fulfillment of the norms, expressing their approval and, naturally, their disapproval.

In short, according to Brennan & Buchanan (1985: 53), «[...] if we want to discover how institutional rules can turn conflict into cooperation, we cannot simply assume that persons who operate within those rules are naturally cooperative. Such a procedure would amount to removing the whole problem by assumption» ([16]). Indeed, although the character of *homo sociologicus* values normative motivations over rational ones in order to solve the problems of collective choice, it would be possible to consider, in the much more global sense, if it is actually not this attitude of the individual which is much more logical than the one that is exclusively guided by rational motivations. In other words, the rationality of the individual, so as to solve the conflicts of collective choice (among the many that exist, this paper examines the one dealing with the provision of public goods), is more understandable if the individual is able to comprehend that these problems require a solution at the heart of the society in which all of the activities are carried out. It is not possible to separate, in this context, the maximization of individual welfare from social welfare, given that greater importance is now placed on public goods as an argument in the utility function of the individual. In addition, this causes, in turn, the utility function or welfare of the individuals of a community to be ever more interdependent.

Nevertheless, it is convenient to carry out a last methodological reflection in this sense. Not by introducing social norms or norms of justice, such as the motivation of the individual to increase cooperation and thus solve the problems of collective choice, do we dismiss the assumption of methodological individualism ([17]) as the most basic foundation on which the theoretical nucleus of constitutional economy is consolidated. This methodological basis is completely supported within a framework in which we are able to cause the social norms to become endogenous so that they act as basic assumptions for individual behavior in the community setting. Therefore, if indeed the *homo sociologicus* is influenced by motivations differing from those which move the *homo economicus* so

([15]) Robertson, P. J., & Tang, S., 1995, p. 70.

([16]) Buchanan, J., & Brennan, G. (1985), p. 53.

([17]) Methodological individualism, as is well-known, is based on individual human action as the fundamental element shaping the whole of social phenomenon.

as to increase his/her degree of cooperation in the community in which his/her economic activities are carried out, our proposition becomes, therefore, a question of how to adapt *homo economicus* in the private sphere as *homo sociologicus* in the sphere of collective choice without causing the former to lose the basic motivation which leads him/her to cooperate and thus, to maximize his/her own welfare. We believe that the proper channel is through the implementation of social norms.

It is from this point that the social norms are converted into constitutional norms. Obviously, the real problem to be solved is twofold. First, we must identify the social norm that respects individual action in the resolution of the problems of collective choice. Secondly, we must determine the true effectiveness of these norms to achieve the proposed objective. This objective is none other than that of increasing the cooperation of individuals in order to raise the provision of public goods toward higher, and if possible, toward the Pareto-optimal levels. Thus, we could then affirm that the implemented norm may be described as constitutional since there is not a more rational strategy of individual behavior than that which is considered irrational from the central focus of the conventional, economic approach.

Therefore, what is involved here is the development of rules of justice which help us to strengthen the justification as well as incorporation of social norms like motivation on which to structure the cooperation of individuals for the provision of public goods. That is to say, we intend to offer solutions to the so-called free rider behavior, which the conventional approach has always maintained, within the framework of voluntary provision of public goods.

However, as observed in the diagram offered earlier, if altruistic behaviors have increased the explanatory level of the traditional model, the adoption or incorporation of norms of social justice, according to the empirical evidence, will also help us to resolve the existence of a voluntary provision of public goods. We should not forget that the voluntary provision of public goods implies the solution to a problem of collective choice. As such, benefits are derived from this action ([18]), that is, the established voluntary provision means that these benefits will be obtained by individuals who make up this group or collective. Sometimes even these benefits transcend beyond the group itself. We may then inquire as to why there are no rules of justice applicable to all the members of a group - rules which propose that each and every one of the beneficiaries of this voluntary provision of the public good contributes, obligatorily, in a solidary rather than a coercive manner, to making this provision effective.

The conventional approach of public economics is only concerned with the individual as *homo economicus*, i. e. how to maximize his/her own level of utility without considering the restriction based on some social norm that acts as a motivation for individuals to cooperate ([19]). The empirical evidence shows that

([18]) On the contrary, there are occasionally no benefits, only costs or losses which the group as a collective must assume and not allow that just a few members of it to be burdened with them. The analysis should be extrapolatory to the opposite effect.

([19]) This conventional focus has been centered fundamentally on those individual behaviors which we have defined as rational and selfish. The result, as we all know, has led to less than optimal solutions based on dominant strategies like those of Nash-Cournot.

the degree of cooperation among individuals is higher than the theory predicts. It is necessary to propose a motivation of normative character through which the individual maximizes his/her welfare. In other words, the individual obviously cooperates so that the provision of public goods is effected with the objective of maximizing his/her welfare. What social norm can be introduced as a basic assumption to the conventional model? It is clear that any rule will be useful if it is one which the group abides by, thus serving the interests of the individual. To restate this idea, we could say that *everyday Kantianism* is a norm of justice which functions socially as a motivation for individuals to cooperate. The individual is willing to assume the level of contributive effort which he/she most prefers; furthermore, the individual does so expecting the rest of the individuals of the community to assume the same. The individual then is obliged to make at least this effort ([20]).

However, this social norm of cooperation, if indeed strict in its conception, is also rather unfair. In the case that only one individual in the group is willing to contribute, is it fair that he/she should bear the total cost of financiation? No one obliges the individual to fulfill this social norm; not even the rest of the community is obliged to do so. In confronting this situation, it is clearly not practical to fulfill the social norm described in this context. It is necessary to loosen and reformulate this social norm if we want it to function for all the members of the community.

Perhaps a principle of reciprocity, as a norm of justice differenciated from the Kantian principle or that of unconditional commitment, is indeed more plausible ([21]). It is an attempt to implement a principle through which one must contribute toward the voluntary provision of the public good so that principles of non-cooperation are not adopted when the rest of community *is* contributing. This principle does not require the individual to contribute more than the others, thus it eliminates the injustice contained in the aforementioned principle. The individual has then obligations to the rest of the individuals whose contributions provide the former with benefits. For this norm of justice to work, it is not necessary for there to be a community or an organized society in the sense that the group of individuals which contributes is indeed a group, and the one benefiting from the output provided by these individuals (even when rejecting a particular level of contribution) has obligations to those who contribute. In other words, the reciprocity among the contributions which the different individuals should make is itself a social norm of cooperation which may be valid for eliminating free rider behavior, and therefore, valid for attaining efficient levels of allocation in public goods greater than those of the Nash-Cournot solution.

([20]) The original principle implies that the individual acts in such a way that he/she wishes that his/her behavior were the norm of universal behavior. Sugden (1984, 774) has called this *the principle of unconditional commitment.*

([21]) *Ibid.*, p. 775. The principle described indicates that within the group, all the individuals make a cooperative effort of at least *d* except the individual *i*, who chooses a level of contribution hoping that the rest of the group members will at least match the sum. If the level of contribution chosen by *i* is not less than *d*, then he/she is under the obligation, in relation to the rest of the group, to make a contribution of at least *d*.

The explanatory limits of social norms: the reciprocity principle

Despite the coherent development and implementation implied by the introduction of this normative motivation, it is clear that the solution for suboptimality in the provision of public goods will not be fully solved as seen through the following ([22]).

If we assume the function of welfare of the utility of the individual U_i is defined in terms of the public good, z, and the contributive effort made by the individual for the provision of z is q_i, the following may be observed:

$$U_i = U_i(q_i, z) \text{ such that } \frac{dU_i}{dq_i} < 0; \ \Lambda \ \frac{dU_i}{dq_i} > 0$$

Likewise, the marginal relation of substitution (MRS) between z and q is defined as:

$$h_i(q_i, z) = -\frac{\partial U_i/\partial q_i}{\partial U_i/\partial z} \ \forall \ i = 1, 2, 3, \ldots, n$$

Therefore, the superior term as well as the inferior term of this ratio are positive for all the individuals. If the reciprocity principle indicates that each individual achieves a specific level of contribution for the provision of the public good, the individual i should also achieve this same level. The level of contributive effort of each individual must now be defined. The accepted alternative, first suggested by Feinstein and later developed by Sugden (1984), shall be the definition of effort as *relative money contribution*: the contributive effort of a person is gauged in terms of his/her income. If the income of any given individual is taken as a parameter, this definition is coherent with the model in that the public good to be provided may be defined as:

$$z = f\left(\sum_i \ \alpha_i * q_i\right)$$

([22]) What we are attempting to argue is that once the restriction introduced into this model is structured, that is, the individual behavior under the proposed norm of *reciprocity*, a departure from the dominant equilibrium of Nash-Cournot can be reached. However, the departure proposed as valid responds to the individual's expectations (the individual i expects the rest of the group will contribute Q^e) bringing the level of provision to the Pareto-optimal equilibrium:

$$\frac{dQ'^e}{dq_i} > 0 \text{ such that } Q' = z - q.$$

What we also want to obtain is that the departure is structured institutionally, which implies that we are moving the problem from the standpoint of conventional rationality as a singular source of behavior towards the field of collective choice. Indeed, in this context, the assumption of identical preferences must not be confused with the symmetric equilibriums, given that in the conventional model the latter leads us to worse solutions than the initial Nash-Cournot. Now the dominant strategy is not the maximization of welfare based on conventional rationality (i. e. the non-cooperative type).

The public good z depends on the total effort made by all individuals. The parameter ai is a positive constant for each person and is used to present the conceptual level of contributive effort, since even with the equal effort of each one, not all these efforts carry the same weight in the financiation of the public good to be provided.

However, as mentioned earlier, the reciprocity principle is put into practice in the group of persons who so desire it. If the provision is to be extended throughout the society, a society which is larger than the group itself, the function F must be constructed and defined for a given vector of the levels of contribution $q = (q_1, q_2, ..., q_n)$. Thus, for each group of individuals G, and for each level of contributive effort of the members of group δ, $F(G, \delta)$ is defined by ([23]):

$$F(G, \delta) = f\left(\sum_{j \varepsilon G} \alpha_j \cdot \delta + \sum_{k \notin G} \alpha_k \cdot q_k\right)$$

This function F offers us the amount of public good provided when each member of the group contributes d, and the other individuals who do not belong to the group contribute q_k. For each group of type G defined and for each one of its members, using as a constant the contribution q_k of the individuals k $(k \notin G)$, if the amount $q_i^{\,G} = \delta$ is adopted as that which maximizes the utility function $U_i[d, F(G, \delta)]$ upon deciding individual i what level of contribution should be chosen for all the members of the group, this becomes the amount that he/she would choose ([24]).

However, this model fails to give the optimal solution (in Paretian terms) to the necessary contribution q which is required to achieve private or voluntary provision of the public good. In other words, in the general case in which there is a pattern of non-identical preferences (q_i, z) for each one of the individuals i, the only thing that can be guaranteed is the existence of the vector of equilibrium q of the individual contributions. Considering the case in which the individual i does not contribute anything, one can assume that he/she does not belong to the group G of contributors. By definition, G is the largest group of individuals obliged to contribute a quantity, say γq, so the individual i is not obliged and does not belong to the group. Therefore, the contribution of this individual i is compatible with his/her obligation to contribute. Any individual j $(\forall\, j \neq i)$ that belongs to G is obliged to contribute γq, given that everyone in the group contributes the same amount. There is a vector q representative of the level of contribution in that each individual contribution of the members of G equals at least γq. This process may be repeated for other groups ([25]) G', G'', *etc.* in which

([23]) Each level of contribution will depend on the group of individuals G who are taken into consideration, in addition to the contributive effort δ made by said individuals.

([24]) Sugden, R., 1984, pp. 772-778. The reciprocity principle can be summarized as follows: the individual i is obliged to contribute at least q_i^G since the rest of the individuals contribute the same amount. Likewise, if some are contributing less than this amount, the individual i becomes obliged to contribute at least as much as any other member of the group.

([25]) Any other group G', G'', etc. is a subgroup of the group G. The construction of these groups is based on what the individuals who make up the group contribute thereby conditioning all of the group members to contribute at least the same amount.

we would find vectors of the level of contribution q', q'', *etc.* corresponding to each one of them. This repetition could be carried out to the point of achieving a vector q^*, beyond which it is impossible to find another group of individuals which contributes more, but given the initial assumption of reciprocity as already established, the rest of the individuals of this last group defined is contributing the same amount. If this vector of individual contributions fulfills the aforementioned assumption, obviously, for each one of the individual contributors q_i, this vector q^* is the value of the contributions that maximizes the individual's utility or welfare function $U_i (\forall\, i = 1, 2, 3,.., n)$. Therefore, in the context of non-identical preferences described, there is no guarantee of being able to achieve a single vector of contributions which maximizes the utility of all the individuals of the group. On the contrary, the vector of individual contributions q^* is at least guaranteed to exist.

Nevertheless, the vector of equilibrium of individual contributions will only meet the Pareto-optimal conditions when the individual preferences of each one of the contributors are identical. Moreover, the Pareto-optimal level of provision corresponds to the vector of individual contributions $q = (q', q', ..., q')$, where $q' = q_i^\sigma \,\forall\, i$ and s represent the group of all the individuals. Thus, only in the case where the individuals choose the same level of contribution is the Pareto-optimal provision possible, although uncertain. We shall examine all of this in more detail in the next section.

Limiting conditions for the optimum: identical preferences and optimal provision

As an applicable social norm through which a process of cooperation can be established in order to achieve an effective voluntary provision of public goods, the reciprocity principle may be set up as an operative instrument for solving the free rider phenomenon. But only in one particular case can the Pareto-optimal provision be obtained. This case corresponds to that of the contribution ([26]) achieved through the same level of effort by each and every one of the members of the group, and therefore, a sufficient level to arrive at a solution to the problem of the free rider. In the other cases, a suboptimal provision may be guaranteed, although it is greater than that which is obtained through the Nash-Cournot equilibrium. Nevertheless, this guarantee still does not resolve the fact that there is a certain degree of free rider behavior in the individuals of the community under analysis.

There are two conditions necessary to achieve a Parteo-optimal level in voluntary provision:

1) All the individuals of the group must be the same, i. e. all must manifest identical levels of preferences; thus, the level of welfare

([26]) The level or effort to contribute has been defined in terms of the level of monetary income of each one of the individuals while also considering the contribution of each individual in the function of the provision of the public good z. Not because an individual contributes less than another should he/she be considered a free rider.

of each individual i of the community may be justified through the same arguments of the utility function (z, q_i), so that each one of the individuals has the same identical arguments in their utility function; and

2) The function of the provision of the good z is explained by the linear function, i. e. $z = \beta\Sigma_i q_i$.

Given the initial restriction of reciprocity as well as the fact that the obligation to cooperate will be the same for each person in the group, the equilibrium contribution of each individual is also the same, thus, $z = \beta n q_i$. In other words, everyone shows the same vector corresponding to the level of contribution which is achieved in order to provide the public good. The equilibrium, therefore, is reached between the space defined as follows:

1) The level of contribution (q_i^M, $\beta n q^M$) in which the first order condition of optimization is fulfilled, i. e. where the MRS is equal to the MRT, thus $h_i(q_i, z) = \beta n$, being then q^M the contribution that the individual i prefers the rest of the group members to make; and
2) The minimal contribution i is willing to make and reciprocally prefers the rest of the group to make as well. This corresponds to the level of contribution q_m, obtained in the space (q_m, $\beta n q_m$) in which $h_i(q_i, z) = \beta$. Therefore, the level of the equilibrium takes place at the level q^* (as defined before), if and only if the contribution of each individual is included in the space:

$$q_m \leq q^* \leq q^M$$

Only in this case is each individual obliged to match reciprocally the level of contribution of the others without any other principle of selfish-interests or non-reciprocity implying a greater contribution than that resulting from the application of this principle. In the case of $q^* < q_m$, each individual would see that his/her own interest leads to greater contributions, even when there are no expectations as to whether the other individuals adopt the reciprocity principle. On the contrary, if $q^* > q^M$, each individual would be contributing more than what corresponds to him/her, which would probably never happen, since no individual would wish to be under this type of obligation in any kind of group ([27]).

Finally, and in agreement with the aforedescribed, there is only one equilibrium that fulfills the Pareto-optimal criteria. It is the one which coincides to the level of the maximum contribution q^M in which the equality of the marginal relations of substitution and the transformation of each contributor is produced. This level of contributive effort achieved will correspond to the Pareto-optimal level of voluntary provision that the group is able to provide. Any other equilibrium of the defined space will produce a suboptimal level of the provision of the public good under this social norm of behavior presented so far.

([27]) Sudgen, R., 1984, p. 778.

Non-identical preferences and suboptimization: the general case

The problem now established is that of the search for a level of provision of public goods in which, as we shall see, the contributions individuals make (if indeed based upon reciprocity) will not be enough to ensure a Pareto-optimal level of voluntary provision. Therefore, the search is to lower or correct the degree of free rider behavior that may exist in the contributions of individuals. In other words, it is necessary for each individual to contribute more, knowing that the others are doing likewise. The problem arising in this context is that no one wants to be the first to contribute more than the others. If all the individuals know there is a norm of reciprocity for the contribution that each one is to make, and if the preferences are not identical, the problem becomes a question of discovering who is willing to take the first step toward achieving an optimal voluntary provision of this public good. Who is interested in having the voluntary provision of the public good reach a higher level? If we leave aside this extreme solution in which there is an individual who, for selfish reasons of personal interest, can indeed make the provision (given that the benefits alone justify the cost of contributing), the problem becomes to decide who, of all those involved, will take the initiative so that each one, reciprocally, contributes to reduce the difference that is needed, thus achieving the provision. In short, we are facing a problem of collective action, specifically one of a variant of the «chicken game» which is referred to *as the strategy or war of attrition*. In this context it is clear that the first to cooperate voluntarily is the one individual who cannot wait any longer for the voluntary provision to be carried out, so that the rest of the individuals of the community will begin, later, to contribute according to the application of the reciprocity principle which has been implemented as an initial assumption and to which all the individuals of a community adhere. In addition, it is a game of waiting in that:

> [...] waiting is an effective revelation mechanism only when it hurts [...] How much of the value of the public good one is willing to forgo by waiting is directly related to one's cost of providing the good. [...]Thus, people have the opportunity to prove how large their costs are by waiting. Eventually, the person with the lowest cost will become impatient and, having been outwaited, will decide to supply the public good ([28]).

Moreover, once the individual *i* has taken the initial step toward the necessary contribution and if, additionally, the public good is guaranteed to be provided in this way, consider the first moment in which the other individuals decide to adopt the principle of non-cooperation. This would be the dominant strategy if we were in an environment of individual economic rationality follow-

([28]) Bliss, C. & Nalebuff, B., 1984, pp. 2-3.

ing the traditional approach ([29]). However, as indicated earlier, we are influenced by the initial assumption of reciprocity among the different individuals who wish to benefit from the provision of the public good.

Furthermore, in this context of non-identical preferences in which a vector of contributions of equilibrium is obtained, yet it is not the Pareto-optimum (since it does not fulfill the two premises put forth in the prior section), the problem becomes one of finding out who will be the first person to cooperate. If we start with the fact that all individuals are not identical and not all will be equally patient, what we have are different costs for each individual in order to achieve voluntary provision. Therefore, the one who assumes the lowest costs in making the first contribution will be the individual who initially reveals his/her willingness to do so ([30]). The others will cooperate by contributing at least the same amount given that reciprocity exists as a social norm. The solution will be obtained in terms of the size of the group of contributors. The larger the group, the more likely we are to find this individual. Additionally, opening the group to new individuals increases the probability of making the contribution before too much time goes by, although it may increase or diminish the possibility of someone acting almost immediately. It is clear that, if we study a group that is growing, we will see that as the size of this group approaches infinite, the time of waiting before the first person contributes approaches zero. Indeed, someone will contribute immediately upon finding incentive in not waiting, given that his/her costs in the provision of the public good are zero, which means the free rider problem will disappear ([31]). So in locating the first contributor, the problem we face is solved.

Lastly, one can affirm that if no principle of reciprocity exists as a social norm under which all individuals are motivated to cooperate, the solution could never be furnished by the adoption of strategies based on the assurance game, and much less on strategies of attrition. The absence of reciprocity would mean

---

([29]) Taylor, M. & Ward, H., 1982, pp. 350-370. This would be the dominant strategy in the case of a prisoner's dilemma. Upon introducing reciprocity as a restriction to the maximization of personal utility, a type of brinkmanship prevails such as that of the assurance game. This means that the individual creates and widely announces that he/she intends to convert cooperation into a relatively undesirable, although viable, option. In other words, knowing that the contribution of the individual is insufficient in order to provide the public good, or that it may only be enough to provide a small percentage of it, each individual will prefer not to cooperate if the others behave in this way, but (in the case of reciprocity) the individual may prefer to contribute if the others contribute too.

([30]) It is a question of determining the degree of patience of each individual in relation to the costs undertaken in order to carry out the provision. Therefore, the most impatient individual is the one who has the least costs to undertake.

([31]) Bliss, C., & Nalebuff, B., 1984, p. 3. This argument suggests the free rider problem is greater when dealing with only a limited group of potential contributors. Thus, we can affirm that the larger the contributing group is, the easier it is to solve the problem of the free rider. «Even in small groups, company is appreciated while waiting for a volunteer; more people in the same boat helps make everyone better off» (p. 11). One should remember, in agreement with Olson (p. 35), a widely celebrated result in a context of conventional rational economy is that «the larger the group, the farther it will fall short of providing an optimal amount of a collective good.» Through this new point of view, as developed in this paper, the exact opposite takes place.

returning to the model of the prisoner's dilemma in which individual rationality, based on the maximization of self-interest as a dominant strategy would create an unlimited wait for each individual. There are two basic reasons why no volunteer would appear to take the initial step. First, through this strategy, all the individuals have an elevated cost to undertake in order to supply the public good. Second, if someone contributes enough to carry out the provision, the others understand perfectly that the free rider strategy is the one that best maximizes their welfare. In this case, as the group grows, the problem of the free rider worsens. Therefore, it is necessary to continue the search for «more gracious ways to find a volunteer than relying on brinkmanship. Binding agreements combined with side payments can always produce a superior outcome. [...] Relying on a private individual to supply a public good is usually the last option» ([32]).

On the contrary, one exception can be made to the aforesaid. In the case described earlier, the voluntary provision is made by an individual or a group of individuals which is smaller than the target group since their self-interests with the objective of maximizing their utility function and the benefits taken would outweigh the costs associated with this provision. This indicates a behavior which is rational as well as selfish in that it is aimed at attaining an outcome. In other words, we would find ourselves, once again, facing a behavior of rational cooperation.

Conclusions

Through this paper we have attempted to argue that once implemented the assumption to be introduced into the model (i. e. the individual behavior under the norm of reciprocity), a departure from the Nash-Cournot equilibrum is, therefore, created. Additionally, the departure which is implemented responds to the individual expectations described earlier ([33]).

The departure then becomes a positive approximation to the Pareto-optimal equivalent. It is also a question of a departure that is institutional, which brings us to how the problem, as seen from the perspective of conventional rationality as the only source of behavior, is taken to a more cooperative standpoint. Now the dominant strategy is not the maximization of welfare based on conventional rationality. Moreover, it is possible then for *homo economicus* in the purest state to be transformed so as to adopt the premises of *homo sociologicus*, of course, without relinquishing the defining characteristics of individualism.

In summary, the analysis carried out in this paper has clearly shown that the voluntary provision does exist and is produced at levels which, even being

([32]) Bliss, C., & Nalebuff, B., p. 10.

([33]) See note 20. In short, it is a question of finding the answer to:

$$\frac{dQ'^{e}}{dq_i} > 0$$

at suboptimal levels, are higher than those achieved through the Nash solutions. This evidence carries the following implications:

1) The Theory of Collective Action is justified, and thereby locates an important area of action in order to possibly move this provision toward higher levels;
2) As the only one capable of correcting the free rider behavior (although this would require a separate study), the public provision establishes itself as a serious alternative to the private provision, although the role assigned by conventional theory of public economics to the latter has always been scarce, if not, altogether nonexistent;
3) The idea of appealing to the central authority as the only efficient agent-supplier of public goods is not so clear. Even if these public goods were so pure (in the Samuelsonian sense), the instruments which are used to achieve a Pareto-optimal public provision are scarcely operative ([34]);
4) Finally, through all that we have seen, the conventional idea of appealing to the central authority to supply those purely public goods is not justified. The theory assumes, given the appearance of free rider behavior, that public goods would never be provided through voluntary mechanisms. Furthermore, this would open another debate on the free rider behavior adopted by the central authority itself when sufficient voluntary provision of the goods is already being supplied ([35]).

([34]) Are the mechanisms of Clarke-Groves or the ones like Groves-Ledyard really effective for solving the free rider problem? Likewise, are the political mechanisms of representation really efficient in offering a solution to the revelation of individual preferences and, consequently, to the function of social welfare? This is where the problem related to the public provision of public goods truly lies.

([35]) See Becker, E., & Lindsay, C. M. (1994) who offer a surprising analysis of this type of behavior.

REFERENCES

ARROW, K. J. (1970), «Political Economic Evaluation of Social Effects and Externalities», in J. Margolis (ed.), *The Analysis of Public Output*. New York, Columbia University Press.

BECKER, E., & LINDSAY, C. M. (1994), «Does Government Free Ride?». *The Journal of Law and Economics*, vol. XXXVII (April 1994). University of Chicago, pp. 277-296.

BLISS, C., & NALEBUFF, B. (1984), «Dragon Slaying and Ballroom Dancing: The Private Supply of a Public Good», *Journal of Public Economics*, 25. North-Holland, pp. 1-12.

BRENNAN, G., & BUCHANAN, J. M. (1985), *The Reason of Rules. Constitutional Political Economy*, Cambridge, Cambridge University Press.

BUCHANAN, J. (1971), «The Bases for Collective Action». New York, General Learning Press. pp. 1-18.

CORNES, T., & SANDLER, R. (1984), «The Theory of Public Goods: Non-Nash Behavior», *Journal of Public Economics*, 23, North-Holland, pp. 367-379.

CORNES, R., & SANDLER, T. (1986), *The Theory of Externalities, Public Goods, and Club Goods*, Cambridge, Cambridge University Press.

ELSTER, J. (1983), *Sour Grapes. Studies in the Subversion of Rationality*, Cambridge, Cambridge University Press (spanish edition by Enrique Lynch (1988): *Uvas Amargas. Sobre la subversión de la racionalidad*, Barcelona: Ed. Península/Ideas).

—— (1985a): «Weakness of Will and the Free Rider Problem», *Economics and Philosophy*, 1 (1985). Cambridge, Cambridge University Press, pp. 231-265.

—— (1985b), «Rationality, Morality and Collective Action», *Ethics*, 96, University of Chicago (October 1985), pp. 136-155.

—— (1990), *The Cement of Society: A Study of Social Order*, Cambridge, Cambridge University Press.

—— (1993), *Political Psychology*, Cambridge University Press (spanish version by Alcira Bixio (1995), *Psicología política*, Barcelona, Gedisa).

JOHANSEN, L. (1977), «The Theory of Public Goods: Misplaced Emphasis?», *Journal of Public Economics*, 7, North-Holland, pp. 147-152.

OLSON, M. (1965), *The Logic of Collective Action*, Cambridge, Massachusetts: Harvard University Press.

ROBERTSON, P. J., & TANG, S. (1995), «The Role of Commitment in Collective Action: Comparing the Organizational Behavior», *Public Administration Review*, vol. 55, n.º 1, pp. 67-80.

SUGDEN, R. (1984), «Reciprocity: The supply of public goods through voluntary contributions», *The Economic Journal*, 94. U. K., pp. 772-787.

TAYLOR, M., & WARD, H. (1982), «Chicken, Whales and Lumpy Goods», *Political Studies*, vol. 30, n.º 3, 350-370 (spanish version by J. M. Colomer (1991), Lecturas de Economía Política Positiva, *Libro de Bolsillo*, 97, I. E. F. Madrid, pp. 219-260).